

3 Mini-Talks:
IPPM Surveyor Project /
QBone Measurement Architecture/
Abilene SNMP Stats (S. Wallace)

DOE/NGI Testbed Planning
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Berkeley, CA



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Surveyor Goals

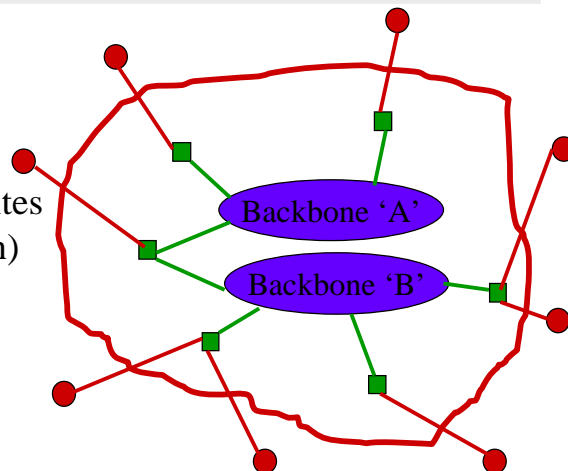
- Goal: accurate one-way loss/packet delay measurements
- Surveyor is an **active** measurement tool
- IETF IPPM WG defining one-way delay
- Take all delay to be due to:
 - Propagation
 - Transmission
 - Queuing
- Variation in delay suggests congestion

Surveyor Node

- Pentium + patched BSDI OS + GPS card
- Active test streams of small, time-stamped packets sent with Poisson distribution ($\lambda=2$)
- Timestamp and delay measurement accuracy better than 100 μ sec

Surveyor Deployments

- Campus demarks
- GigaPoPs
- Exchange points
- LANs at key host sites (e.g. tele-immersion)
- 54 nodes deployed; nearly a full mesh



DOE/NGI Surveyor Deployments

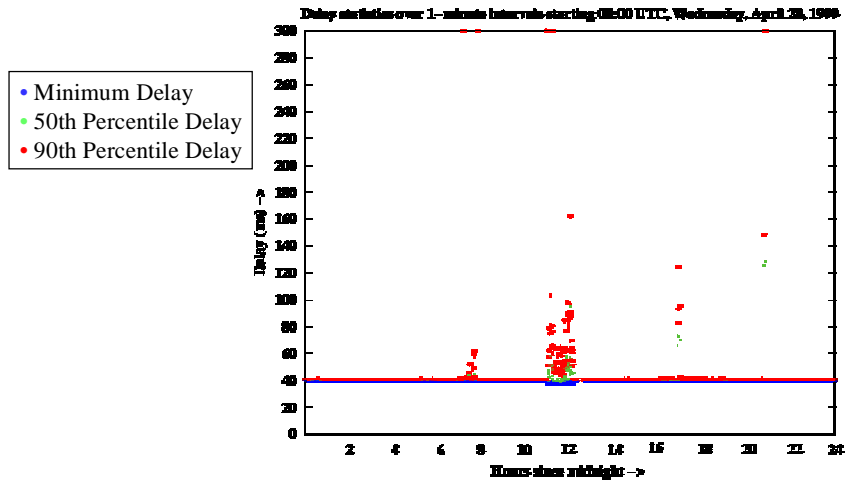
■ UWisc	wisc.csg	■ SLAC	slac.doe
■ FNL	fermilab.doe	■ ISI	
■ ANL	argonne.ti	■ CalTech	
■ NSCA	ncsa	■ SDSC	
■ NWU		■ BNL	bnl.doe
■ Uchicago	uchicago.csg	■ PPNL	
■ IU	indiana.gigapop	■ Princeton	
■ NCAR	ncar	■ Abilene	all internal nodes
■ UUtah	utah.csg		
■ LANL			
■ LBNL			

Surveyor Data Dissemination

- Historical data archived at Advanced (Spring '97 -)
- Cool summary plots on the web:
 - Min, 50th percentile, 90th percentile delays
 - Loss
 - Delay histogram
- CGI-based Surveyor Summary Server (SSS)
- Java/Excel visualization/analysis front-ends to SSS

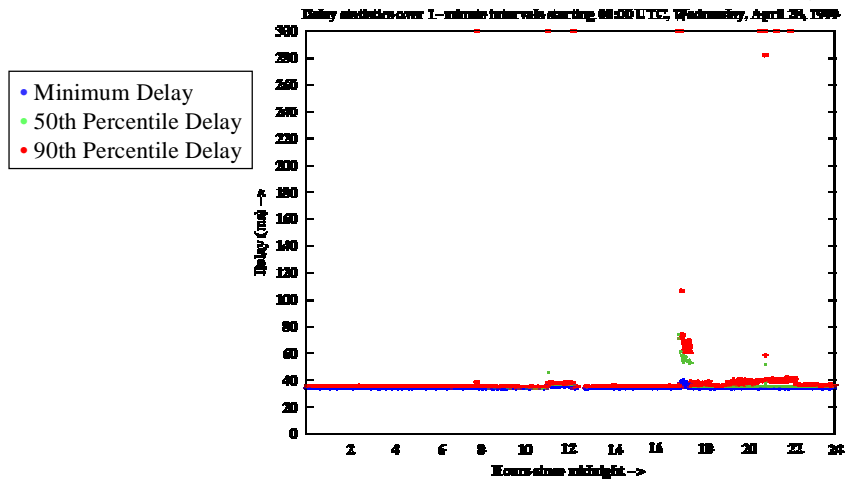
Typical Internet2 Performance₁

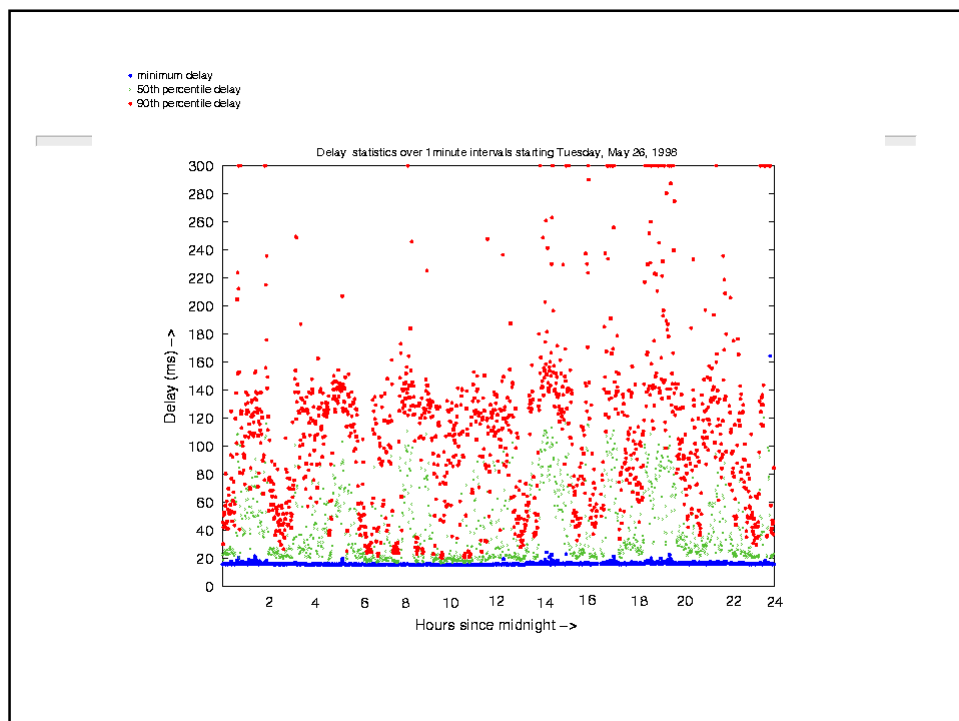
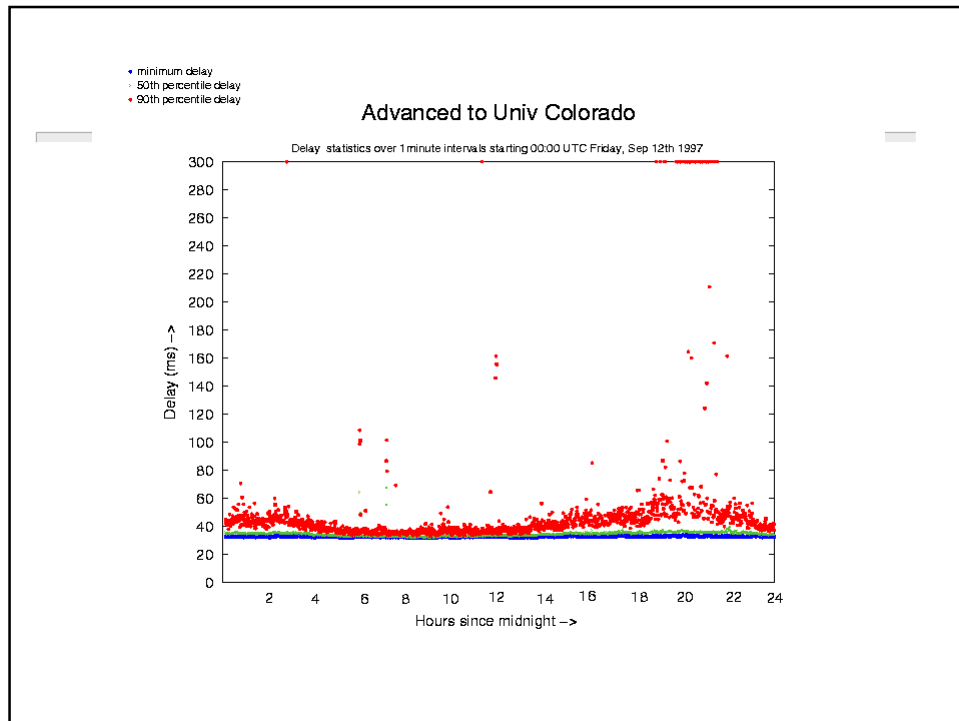
East Coast University to West Coast DOE Lab

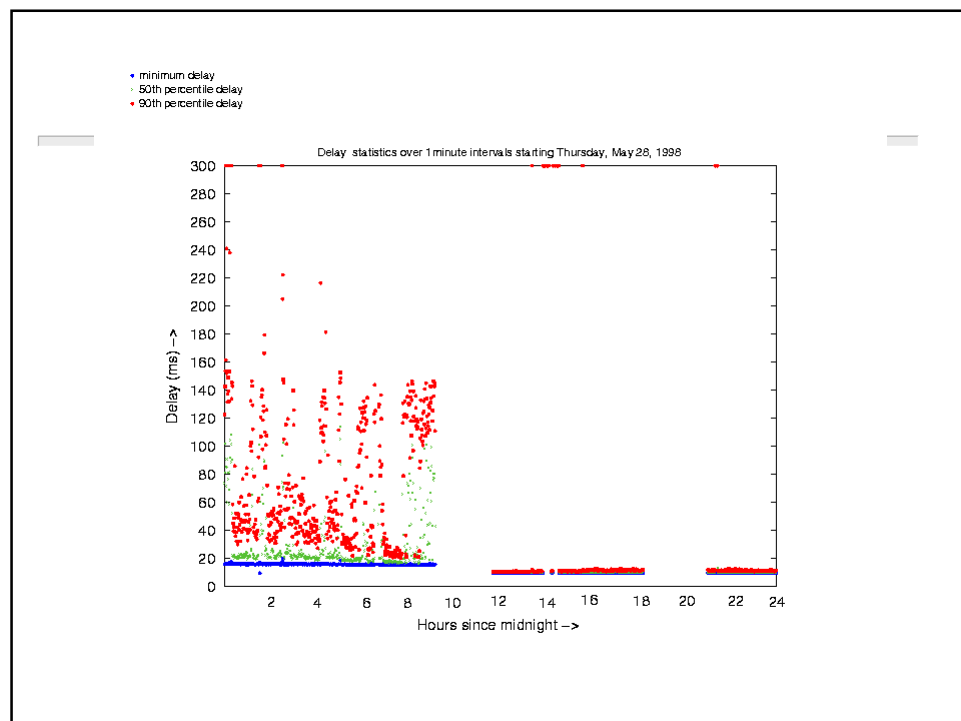
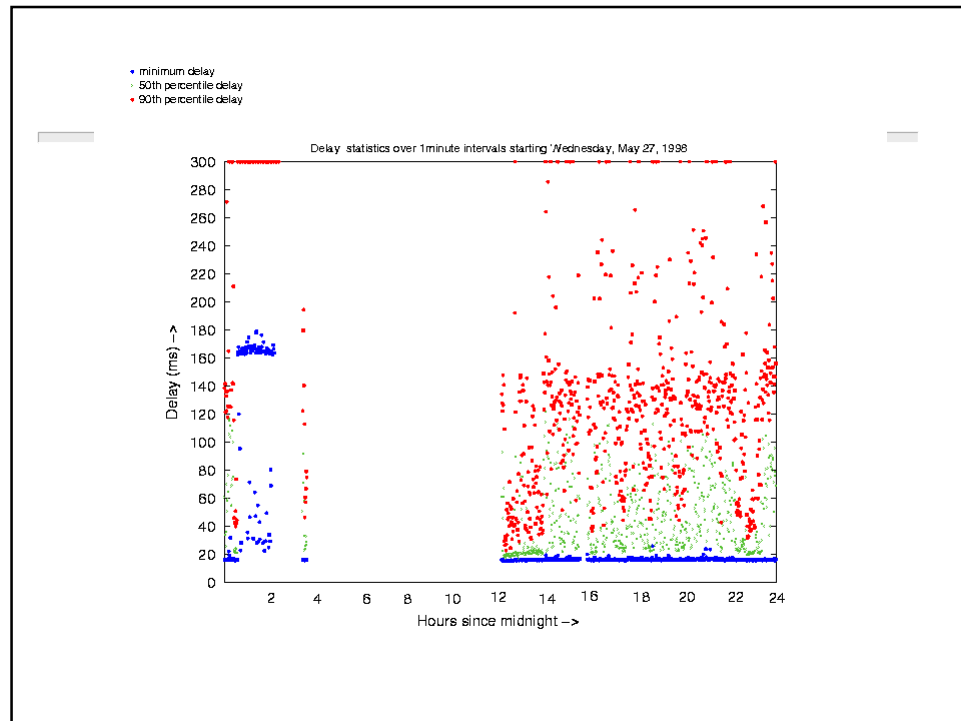


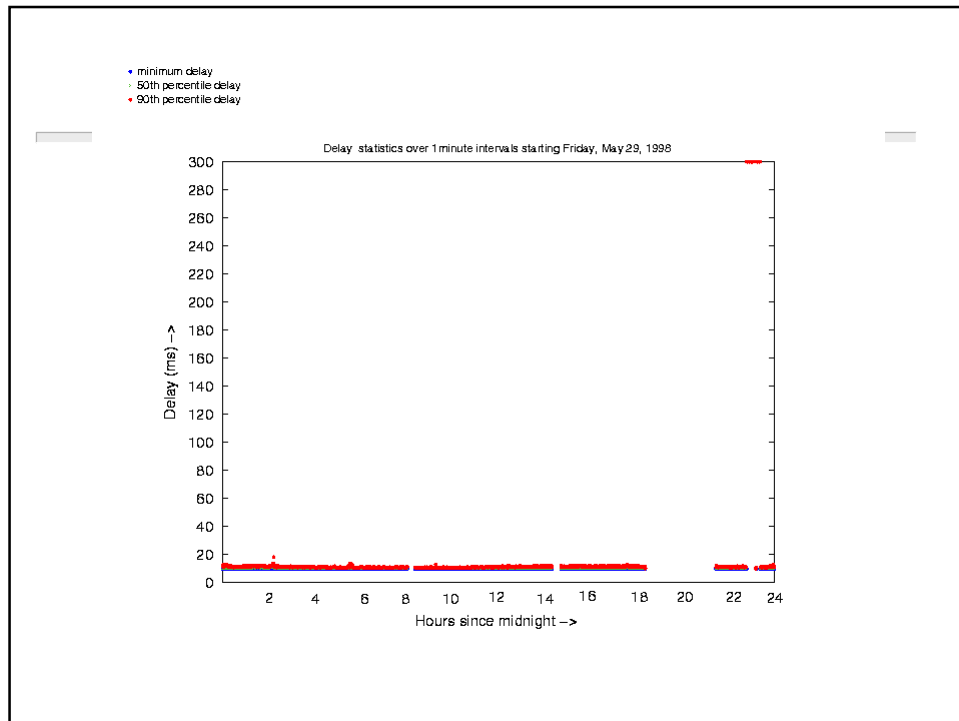
Typical Internet2 Performance₂

West Coast DOE Lab to East Coast University









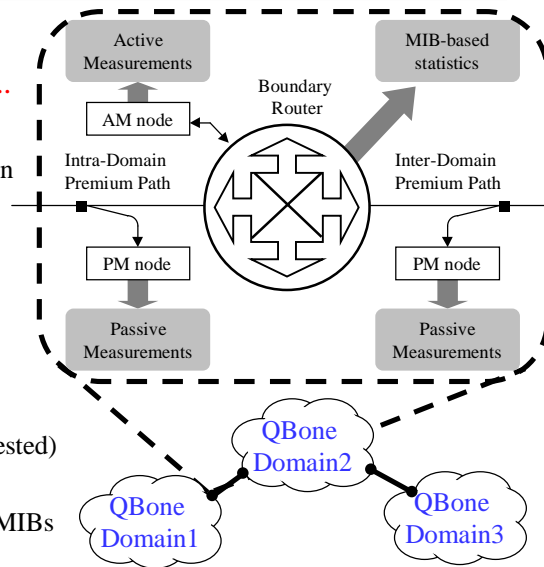
QBone Architecture (10km view)

- IETF “Diff” (EF PHB) + QBone “Serv” (QPS)
- QBone Premium Service
 - Idea: converge on Jacobson’s VLL “Premium” service
 - Well-defined SLS:
 - Peak rate **R** & “Service MTU” **M** implying a token bucket meter
 - Near-zero loss
 - Low jitter
 - Delay variation due to queuing effects should be no greater than the packet transmission time of an MTU sized packet
 - All bets are off if the reserved interdomain route flaps
- Plus important value-adds:
 - Integrated measurement/dissemination infrastructure
 - Experimentation with pre-standards inter-domain bandwidth brokering and signaling

QBone Measurement Architecture₁

■ Collection

- **✓ metrics, EF and BE...**
- Active metrics
 - One-way delay-variation
 - One-way loss
 - Traceroutes
 - e.g. IPPM Surveyors
- Passive metrics
 - Load
 - Discards (suggested)
 - Link bandwidths (suggested)
 - EF reservation load
 - e.g. OCxMon, RTFM, MIBs



QBone Measurement Architecture₂

■ Dissemination

- HTTP, even for raw data
- real-time + archived measurements
- Canonical names for:
 - Metrics
 - Domains
- Standard metric aggregations:
 - Mostly 5-minute aggregations
- Standard URL name space for:
 - MRTG-style plots
 - Raw ASCII data
 - `http://<root_URL>/<source_domain>/<dest_domain>/<first_hop>/<date>/<type>.<aggregation>.{html | gif | txt}`

Internet2 Measurement WG

- Co-Chairs: David Wasley, Univ California and Matt Zekauskas, Internet2 staff
- Focus:
 - Places to measure:
 - at campuses, at gigaPoPs, within interconnect(s)
 - Things to measure:
 - traffic utilization
 - performance: delay and packet loss
 - traffic characterization

For more information...

- QBone home page:
<http://www.internet2.edu/qbone>
- Internet2 QoS Working Group home page:
<http://www.internet2.edu/qos/wg>